Space Weather Forecast

Issued on Saturday, 30 October 2021 at 01:26 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Large CME expected to arrive at Earth later on 30th persisting into the 31st. G1/G2 minor to moderate storming with a likelihood of Strong G3 at times. Chance of Aurora sightings for Northern UK. Chance of further moderate flares from sunspots.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity was Moderate with one Moderate-class flare from a complex sunspot in the northeast of the Earth-facing Sun. A further sunspot in the southwest, which was the source of a strong flare (X1) and associated coronal mass ejection on 28th has simplified a little in the last 24 hours. There are also Two further small and simple sunspots on the disc. No further Earth-directed CMEs (coronal mass ejections) were observed in available imagery in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds were at background low levels, with speeds of around 300km/s (very ambient for the solar wind). The magnetic field carried by the wind was very weak with no notable component in the important north-south direction. Geomagnetic activity remained Quiet (Kp0-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has been at S1 (Minor) level throughout, as a result of the strong flare that occurred on the 28th.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to Low solar activity is forecast with further Moderate-class flares possible. These most likely from the more complex sunspot on the disc, rather than the sunspot which was the source of the strong flare on the 28th.

Solar Wind / Geomagnetic Activity: A large CME from the strong flare on the 28th has been analysed and is forecast to arrive at Earth during the second half of day 1 (30th), most likely around 1600 UTC. Geomagnetic activity is expected to be quiet until then (Kp0-2). During the CME transit, minor to moderate geomagnetic storms (G1/G2 Kp5-6) are expected, with a likelihood of isolated G3/Strong storms (Kp7). Geomagnetic activity is then expected to gradually subside during the latter part of day 2 into day 3 (31st and 1st) with an eventual return to mainly Unsettled levels, and a chance of Active intervals (Kp2-4). A further enhancement to solar winds is then possible at the end of day 4, with a chance of G1/minor geomagnetic Storms. Aurora is likely to be visible for some northern parts of the UK, given clear skies.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) will continue declining from their current S1/Minor storm, likely falling below the S1 level day 2 (31st). There is an ongoing risk of further slight rises should any notable flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	90	80	40	30
Strong	G3	No	60	60	5	1
Severe	G4	No	10	10	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	40	40	40	40
Very Active	R3 to R5 X	No	10	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	100	60	10	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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